Study of the Behavior of Sound Velocity and Absorption in Stratified Solutions and Solutions with a Singular Point

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We have studied temperature and frequency dependencies of sound velocity and absorption near upper and lower critical temperatures of stratification, as well as singular points of binary mixtures. Objects of the study were such stratified solutions as nitrobenzene/n-hexane, aniline/cyclohexane, 2,6-lutidine/water, n-dodecane/ƒÒƒÒ¡¦dichlor-diethyl ether, and solutions with singular point (ƒÒ-picoline/water and ƒ×-picoline/water). In most studied solutions near the temperature of stratification and singular point we observed anomalies in the hypersonic absorption. Our estimations showed that the observed excess of hypersonic absorption significantly exceeds a contribution, which is related to diffusion mechanisms of the sonic energy dissipation in the vicinity of phase transition. Some interesting anomalies were revealed in solutions with the singular point. Here, side by side with a maximum of absorption near the temperature of singular point, we observed another maximum of absorption, which was shifted towards lower temperatures. Location and magnitude of this maximum were dependent on the hypersonic frequency. We relate the observed anomalies in the hypersonic absorption near the critical and singular points to possible coupling of the acoustic wave with the anisotropy fluctuations that leads to the energy dissipation. The possibility of this mechanism may be confirmed by such fact as a narrowing of the Rayleigh line wing near the critical and singular points, which was observed earlier in the studied solutions.